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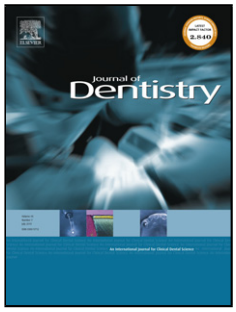


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8 June 2017
Unilever – Guest Forward Journal of Dentistry tooth whitening supplement.

# Guest Editorial

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It is often said “One smile can make the difference” and the importance of a smile cannot be underestimated. It is therefore not surprising that the population increasingly request a “whiter” smile to potentially improve quality of life, fuelled by public heightened awareness of oral healthcare product benefits. A literature review on tooth colour and whiteness documented in this supplement shows that psychophysical studies via third party assessment of tooth images lead to more positive views of social competence, appeal, intellectual ability and relationship satisfaction from whiter teeth (QUOTE - Review Article v4 (5th October 2016) Clearance Version). (Joiner and Luo) Consequently the oral healthcare team, stakeholders and researchers are keen to continue to develop and deliver superior whitening agents for the public, as indeed others have for preceding centuries, the first written evidence of whitening agents used on teeth to improve the cosmetic appearance dating as far back as 1500 BCE in the Ebers Papyrus.

The intrinsic colour of a tooth is determined by how light is scattered and absorbed at the tooth surface and within the tooth structure. Enamel is a translucent material with illuminating light following the highly irregular paths in this medium. Enamel does not obscure the colour of the underlying dentine, and the latter therefore has a significant role in determining the yellow based hue of the perceived tooth colour. Dentine colour becomes darker with age, can become contaminated with pulpal blood pigments, altered by systemic illnesses affecting maturation of the crystalline structure or can absorb chemical ions for example tetracycline or fluoride (in fluorosis) to alter tooth colour. Current intrinsic whitening approaches have been predominantly centred on tooth bleaching with peroxide based compounds.

The extrinsic colour of the tooth is determined by surface staining in the acquired pellicle and is influenced by for example, accumulation of plaque deposits, dietary chromogens of certain food stuffs and beverages, tobacco smoking, exposure to iron salts and mouthrinses such as chlorhexidine. Extrinsic stain removal products, often referred to as “whitening” agents, have been developed with enhanced physical and/ or chemical stain removal properties to combat this tooth surface discolouration.

Colour is a subjective sensation experienced by an observer through the light sensitive receptor mechanism in the eye, with the perception of colour determined by the light source, colour of the object and the brain’s interpretation

of the energy signals. One must also remember that colour has three dimensions: firstly the hue (colour in the spectrum), secondly the saturation or colourfulness, and thirdly brightness, resulting in complexity in determining the "colour" of the tooth. Measurement is broadly determined by visual comparison to a reference colour or by instrumental measurement which gives an unequivocal fingerprint of the colour.

This supplement details the effect of a novel silica based toothpaste containing the pigment blue covarine. Deposition of this pigment on the tooth surface is recognised to alter visual perception of whiteness in teeth, shifting a yellow shade to a blue shade to give a whiter appearance to the human eye. New advancements in toothpaste formulation incorporating blue covarine have led to impressive results documented in this supplement, showing significant whitening of teeth after a single brushing of this toothpaste (QUOTE -SWN Men Manuscript v5 (7th October 2016) Clearance Version). (Tao, Smith et al & Tao, Sun et al)

Utilising the latest cutting edge techniques and research methodologies, this colour change has been precisely and robustly described in a series of investigations both visually and combined with the most advanced digital imaging systems and application of colour science. Enhancement of the immediate whitening effect with blue covarine has also been achieved with incorporation of Food, Drug and Cosmetic (FD&C) Blue no.1 (QUOTE SWN Men Manuscript v5 (7th October 2016) Clearance Version). (Tao, Sun et al)

Visual tooth whiteness studies are described detailing the threshold for an average observer perceiving tooth whiteness. Based on psychophysical research, a study showed that following blue covarine application on a tooth, definite perceptible colour changes were visualised confirming that clinicians would be able to identify these changes chairside (QUOTE -Version 5.0 (7th April 2017) Clearance Version.) (Westland et al.)

From a practical point of view it is crucial that new agents do not have deleterious effects on existing restorations and another study gives reassurance this is not the case with blue covarine with regards to the colour of composite or glass ionomer restorations on extracted human teeth versus a known extrinsic staining agent, red wine (QUOTE -**Version 6 (7th April 2017) Clearance Version)**(Philpotts et al). As well as visual colour change measurement, there are a number of contact e.g. spectrophotometer and non-contact e.g. specroradiometer and digital imaging devices that can record colour with great accuracy. Recently a video based digital imaging system has been developed and a paper in this supplement details the high reproducibility of this device for measuring tooth colour and whiteness both in vitro and in vivo, this being far more sensitive than the human eye and of therefore great benefit for clinicians and researchers (QUOTE –Version 8 (13th April 2017) (Clearance Version + SW corrections)(Luo et al).

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The novel approach of the addition of the pigment blue covarine to a silica based toothpaste shows great promise with regards to perceived whitening of the teeth. The optical effects were shown to be immediate after one brushing experience and this was confirmed across the studies documented in this supplement. This series of investigations appear to validate the new technology which can be readily incorporated in toothpastes and hence be accessible to the population at relatively low cost to the consumer.